



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Aleena Byrne	Project Number J1705
Project Title How Does Gravity Affect the Growth Angles of Radish Seeds?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This research project was conducted to study what effects that gravity has on the growth angles of radish seeds. I recently read an article published by the National Aeronautics and Space Administration (NASA), which discussed a test on how plants grew in space. The NASA found that most of the plants grew randomly because there was not gravity in space. In my research project, I planned to identify an experimental method to simulate a directional change in gravity and to see how the sprouting angles of radish seeds respond to the change.</p> <p>Methods/Materials In this research project, I established two test groups, Group A and Group B. Group A tests were conducted by simulating a directional change of gravity. This was done by placing Group A samples on a rotating electrical ceiling fan. I calculated the centrifugal force relative to the earth gravitational force by using the following equation: $Fr = 0.204 \times V^2/D$ (ASGSB, 2005) Where, Fr: relative centrifugal force (m/s²), V: peripheral speed of sample locations on the fan (m/s), D: diameter of the circle of rotation (m). Relative to gravity, this equation gives the predicted angle of 64 degrees. This angle would be the simulated direction of gravity that the seeds would grow towards. Group B is a control group, Group B samples were placed on bookcase, at the same height of the fan (the bookcase was located near the fan,) where gravitational force would be zero degrees from the center of the earth. Group A and Group B tests were conducted concurrently for the purpose of comparison. Radish seeds were selected as testing materials and 6 containers were used to plant these radish seeds.</p> <p>Results After four days of seeds growing tests, it was found that most seed roots grew well corresponding to the simulating angle (64 degrees) of gravity in Group A. The seeds in Group A sprouted in angles between 50 to 60 degrees throughout the whole growth time. Group B seeds roots were found to grow approximately straight down (0 degrees) toward the center of the earth.</p> <p>Conclusions/Discussion These tests have supported my hypothesis. My hypothesis is that the plant roots grow toward the angle where gravity is pulling. Hopefully, in the future, scientists will be able to conduct more tests like mine, but in outer space.</p>	
Summary Statement My project is to study how plant growth responds to angle changes in gravity, and to hopefully find more information on how plants would be bale to grow in space.	
Help Received Mr. Popick (my science teacher) helped come up with the ideas of my project and father helped attached containers to the fan.	